U.S. ARID REALM

focus

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Outlook for the Arid Realm of the United States

The million square miles of dry land in the western United States have a special and spectacular place in the landscape and history of this country. The Indian cultures, the early Spanish oasis settlements, the ranches and their cowboys (still the most widely used theme of the motion picture industry), the Mormon colonies, the desert prospectors, the great multiple-purpose reclamation projects, the winter resorts, the dramatic natural scenes, and the atom-bomb tests are all woven into the unique patterns of the desert and the steppe—patterns that have been set by ever-shifting responses to the limitations and resources of an arid environment.

The "Great American Desert" is an elusive concept. The deserts and steppes are broken into numerous units, separated by barriers of mountains and canyons. The very term "desert" has different connotations in different places. The Mojave and Colorado Deserts are extensive areas of varied terrain, including several basins, plains, and mountains. Farther north the term is reserved for smaller, individual basin floors, such as the Great Salt Lake Desert of Utah. In the desert area of the Columbia Basin, where yearly rainfall is rarely more than 10 inches and often less than 6, the term "desert" is not used; instead, one speaks, for instance, of the Yakima Valley—an innocent-enough-sounding name.

Four broad desert areas, generally recognized but variously delimited, are the Sonoran Desert, extending from west-coast Mexico into California and Arizona (locally, the Colorado Desert); the Chihuahuan Desert, a continuation of the interior Mexican desert into Texas and New Mexico; the Mojave Desert of Southern California; and the Great Basin, between the Sierra Nevada and the Wasatch Range. To these should be added the mid-Rockies deserts from Big Horn Basin to the dry areas of the Green River and the upper Colorado; the Columbia Plateau deserts of Oregon and Washington; and the San Joaquin Valley of California.

In all, the arid zone covers about 34 per cent of the United States—10 per cent desert, and nearly 25 per cent semiarid. The deserts outlined on the accompanying map (on the basis of C. W. Thornthwaite's moisture index* of −40) have in common an extremely scanty rainfall—mostly less than 10 inches a year, and less than three inches in such places as Death Valley and the lower Imperial Valley in California. Vegetation is limited mainly to brush and cactus and is sparse in proportion to the rainfall, except where alkaline conditions eliminate nearly all

* The moisture index is obtained by subtracting six-tenths of the deficiency as percentage of need from the surplus as percentage of need.

vegetation, or where ground water in valleys is near enough to the surface to support thickets.

Interspersed with and bordering the deserts are mountains and plateaus, with greater rainfall and consequent denser growth of vegetation, including a considerable amount of grass. These semiarid steppes stretch over vast areas east of the Rockies all the way from Canada to Texas.

Most of the natural and cultural traits of the deserts and steppes stem from the dominant theme of dryness. Where one can travel for hundreds of miles without crossing a stream, people are as few and far apart as plants. Only near the life-giving rivers are there settlements of any size. In the driest deserts, in the southwest, even livestock cannot subsist on the natural vegetation, except temporarily in the rare years of unusual rain. Where there is slightly more rain, in the less dry deserts and in the steppes, men are still tied to their scattered sources of water, and cattle and sheep must often wander for miles to find enough grass and a drink. It is only in the better-watered uplands or in the subhumid part of the Great Plains just east of the semiarid belt that trees can grow well.

Though less dominant an influence than rainfall, temperatures also cause pronounced regional differences in the arid realm. In the south the baking heat of summer and the mildness of winter encourage, besides the cactus and the creosote bush, the growth of date palms, cotton, grapefruit, and early market crops—and of winter resorts. In contrast, on the cold-winter Columbia Plateau and Great Basin sagebrush and shad scale predominate, along with middle-latitude crops such as alfalfa, wheat, and deciduous fruits.

In the intermountain area one finds hot and cold deserts in close proximity because of the rapid rise in elevation from a few hundred feet above sea level in the Colorado Desert to about 5,000 feet on the floor of the Great Basin. The cold-winter dry regions of the United States resemble those of Central Asia; the hot desert climates of the south are more like those of the Sahara. Cody, in the Big Horn Desert, for instance, with an average January temperature of 23.6°F and a pleasant July average of 69.5°, resembles a Gobi Desert site. In contrast, Needles, a California town on the Colorado River, with a January average of 51.3° and a July average of 93.2°, with most days over 100°, is similar to the scorching towns on the lower Nile.

Different again from these two extreme types is the mild semiarid coastal climate from Santa Barbara to San Diego. San Diego has the mild winters of Needles and the mild summers of Cody, and crops such as lemons, oranges, avocados, and walnuts flourish on the irrigated lands. Small wonder that Southern California has attracted myriad refugees from the interior lands where half the year is too hot or too cold.

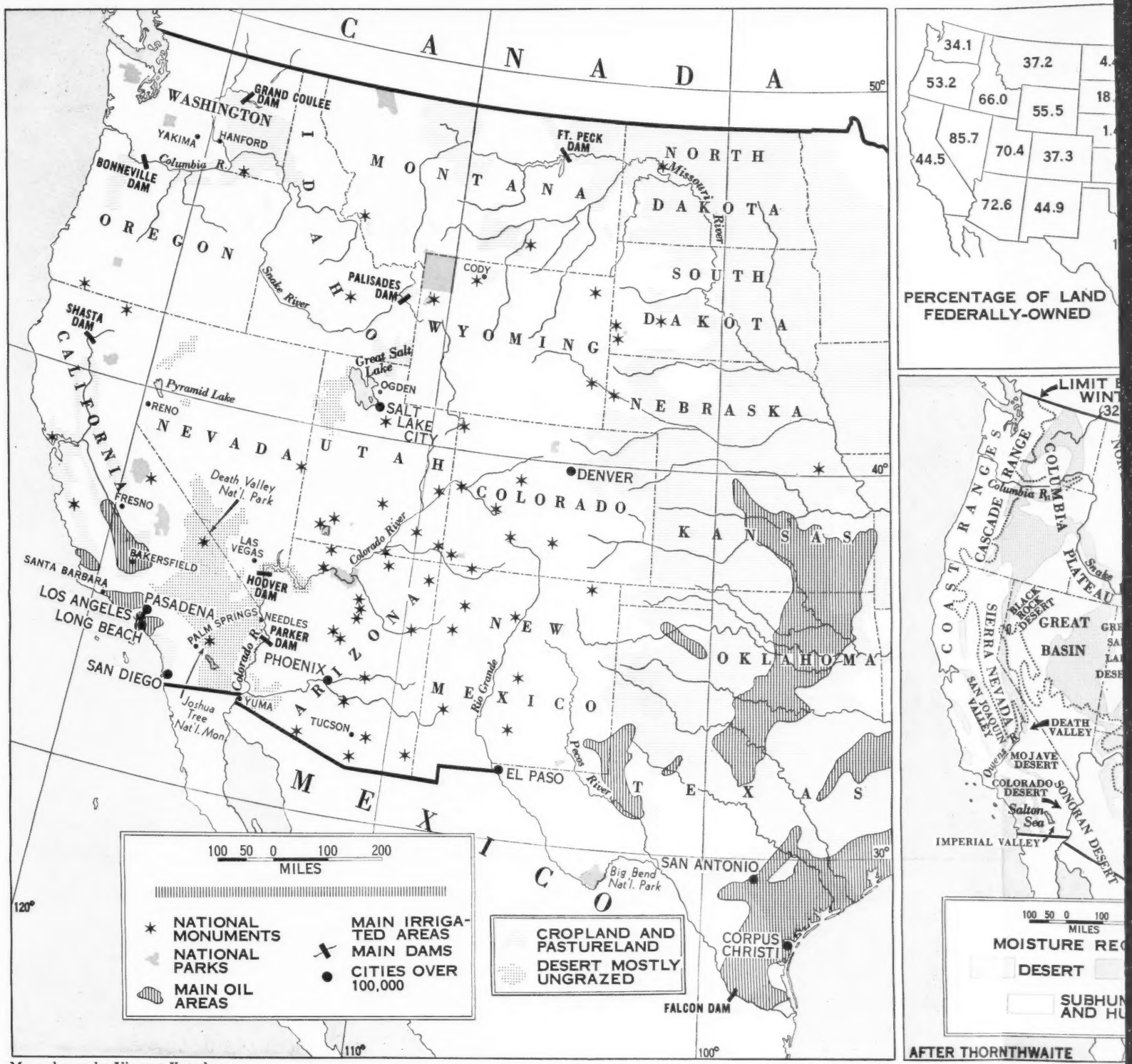
Throughout the arid realm there is competition for the available water. Some of the usable water originates within the realm, but most of it (85 per cent) comes from the humid mountains and foothills in which rise the headwaters of all the major Western rivers and streams. Outstanding among the water sources are the Sierra Nevada and the Cascade Range, the Rockies and their offshoots, and the Coast Ranges.

Where water for human consumption and for crops flows down off the uplands, people have congregated. All the nine cities of more than 100,000 population in the arid realm are fertile oases. Four of them —Los Angeles, San Diego, Long Beach, and Pasadena —grew up in the Southern California coastal area, drawing their water at first from the Coast Ranges, later reaching into the Sierras via the Owens River Aqueduct, and finally even into the Rockies via the Colorado River and Aqueduct. These cities are now major centers of intensive agriculture, aircraft manufacturing, petroleum refining, motion picture production, and tourism.

Two of the nine cities— Denver and Salt Lake City —are essentially mountain-foot and crossroad cities. San Antonio grew up around water, plus gas and oil, and has become an airfield, cotton, and trade metropolis. El Paso has become an international transportation hub, and Phoenix an administrative and health center. The mountain-foot location is a favorite, too, for the smaller towns such as Reno and Ogden, on opposite sides of the Great Basin; Palm Springs, at the desert base of the San Jacinto Range; and Fresno, at the western foot of the Sierras.

Away from the irrigated oases, grazing is the major activity. In addition to 148 million acres in organized grazing districts, most of the national forests and large amounts of other types of public land are grazed. Much of the grazing land in the arid realm is, in fact, public domain. In six states the Federal rural land represents more than half of the area of the state.

The reasons for this great concentration of government ownership in the West are not far to seek. Pri-



Maps drawn by Vincent Kotschar

vate citizens took over the lands best suited for unassisted farming and stock raising, until there were left only the agricultural culls, chiefly desert, semiarid grasslands, and rough mountain lands.

Many of these poorer lands, however, have attained considerable value as a result of technological changes. Above all, rail and highway transportation has made it possible to carry on lumbering, produc-

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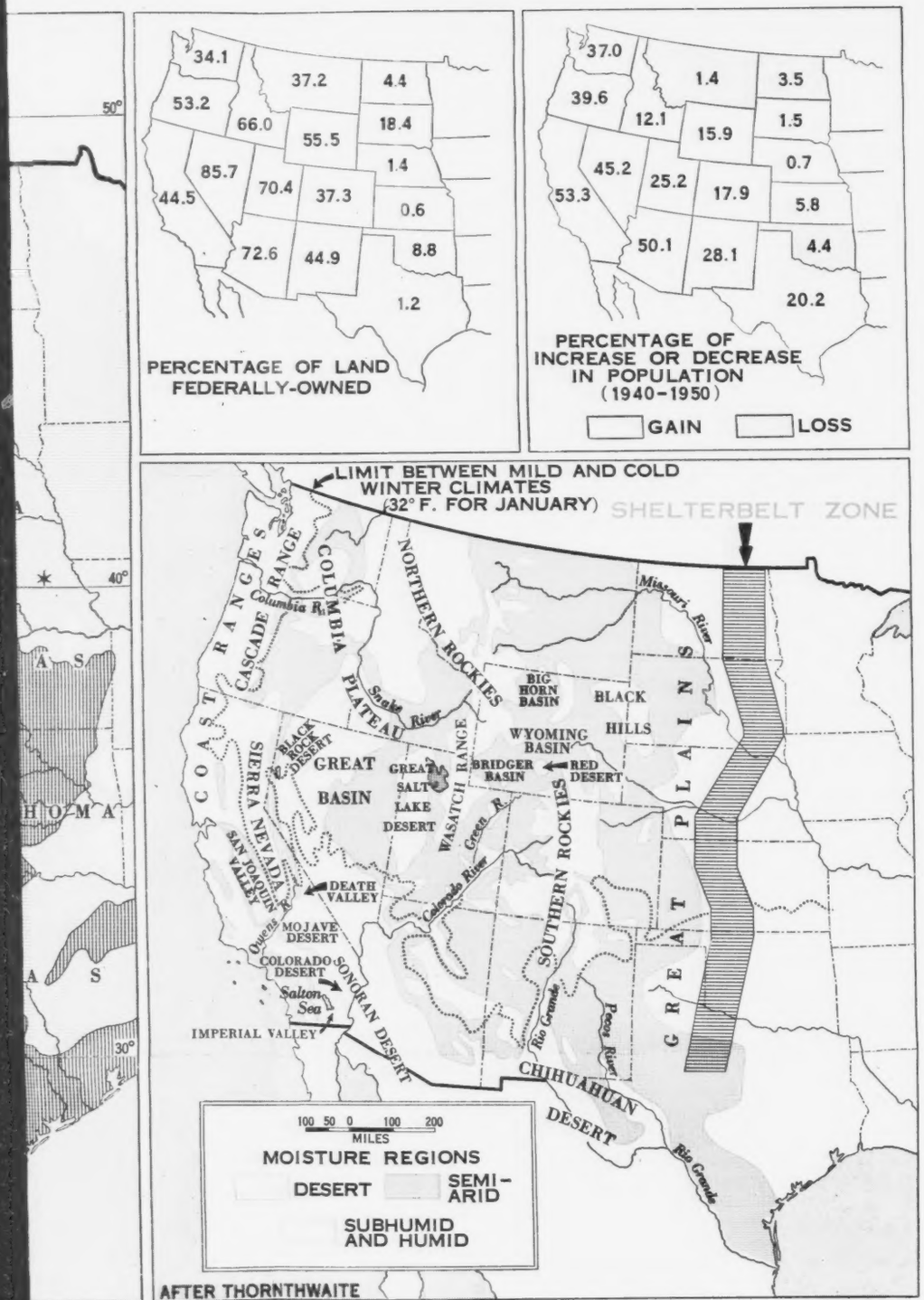

have attained technological transportation ering, produc-

tion of staple crops, and mineral operations that would have been economically impossible in the flush days of homesteading. Although the oil of the eastern and western margins has been the most valuable mineral resource of the arid realm, other minerals are intimately associated with the past and present life of the deserts. The silver mines of the western Great Basin, the copper, coal, and iron of the eastern side of the Great Basin, the copper of the Arizona Highlands, the borax and potash in Mojave playas, the gold mines, and the more than 500 mines now producing uranium ore, have drawn their thousands of followers hither and yon through the desert as mines and prices have waxed and waned.

In spurts, and with occasional shifts in direction, most of the remaining public lands have been assigned to specific primary uses. So accustomed has the public become to having access to these lands for grazing (and for recreation), and so great is the difficulty even today of successfully exploiting them without government assistance, that the trend toward private ownership slowed to a halt about 25 years ago, and there has even been a slight increase in Federal acreage as a result of acquisitions to retire marginal lands and for special military and other purposes.

Because much of the dry stockland is of poor quality, returns per acre are low. In the warmer areas, where year-round grazing is possible, natural vegetation is sparse and meager; in the cooler and higher areas of the intermountain basins and the Great Plains grazing is possible or advisable for only three to five months of the year. There is, consequently, a great deal of seasonal migration between the lower areas and the upland national forests. Added to this, distances between stock watering places are great, brush has invaded large areas at the expense of grass as a result of unseasonable or too heavy grazing, and tremendous areas are in a state of advanced erosion from these practices.

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The Federal agencies responsible for leasing grazing rights have attempted to improve the situation by making land capability surveys, setting limits on the number of head of stock to be admitted, establishing entry and departure dates to assure maximum forage use without destruction of the grass, reseeding desirable species, building control fences, eradicating brush, and developing watering places by well drilling or other methods. Unfortunately, their efforts so far have been limited by the amount of their funds and by the opposition of some of the ranchers.

Recreation has become another major activity in the dry lands of the West. In New Mexico it is estimated that tourism is the largest single source of income; not only businessmen but also the state treasury benefit from the constant flow of tourists. Most other Western states rely on automobile travel as their second-largest source of taxation.

Hundreds of national parks and monuments, maintained by the Park Service, are scattered through the West, such as the big three of the desert: Death Valley National Monument and Joshua Tree National Monument in California, and Big Bend National Park on the Rio Grande in Texas. The Park Service develops and maintains bathing facilities in the lakes created by power and irrigation projects; the Fish and Wildlife Commission looks after the fishing in these lakes.

The most intensive and spectacular desert development is the far-reaching program of reservoirs for multiple use. Individual and small group diversions of water for irrigation occurred early in the settlement of the desert margins. By 1890, nearly four million acres were under irrigation, but expansion had virtually reached its limit because most of the simple water diversions had already been made. Irrigation development at sophisticated levels needs, not large acreages, but large amounts of capital and experienced men. Passage of the Newlands Act in 1902, putting the Federal government into reclamation to irrigate 160-acre tracts, rejuvenated irrigation activity.

For 25 years Federal irrigation projects were undertaken for irrigation alone. In 1928, for the first time, a truly multipurpose project was initiated: Hoover Dam on the Colorado River. Subsequent projects have recognized as a matter of course the desirability of using the stored water systematically for a variety of other purposes as important as irrigation to the life of the area: power generation for home and industrial use, flood control to reduce the enormous yearly costs of damages, and recreation. It is the sale of power more than any other factor that makes it possible to supply irrigation water to irrigators at bearable rates. The Columbia Basin Project, featuring Grand Coulee Dam and its 150-mile lake, is one of the latest of the big Bureau of Reclamation projects to be opened. Its installed power capacity of 1,974,000 kw. makes it the world's largest power plant, and ultimately it will irrigate more than a million acres of desert and semiarid land.

Altogether, the Bureau now supplies water to about 6½ million acres, and it estimates that it can eventually irrigate 22 million acres more. The total area irrigated in the 17 Western states (by both Federal and private projects) is now 25 million acres,

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